

Innovation, Technology, and Knowledge Management

Steven P. MacGregor  
Tamara Carleton *Editors*

# Sustaining Innovation

Collaboration Models  
for a Complex World

 Springer

# Innovation, Technology, and Knowledge Management

## **Series Editor**

Elias G. Carayannis, George Washington University, Washington D.C., USA

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Editors

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# Series Foreword

The Springer book series *Innovation, Technology, and Knowledge Management* was launched in March 2008 as a forum and intellectual, scholarly “podium” for global/local, transdisciplinary, transsectoral, public–private, and leading-/“bleeding”-edge ideas, theories, and perspectives on these topics.

The book series is accompanied by the Springer *Journal of the Knowledge Economy*, which was launched in 2009 with the same editorial leadership.

The series showcases provocative views that diverge from the current “conventional wisdom,” which are properly grounded in theory and practice, and that consider the concepts of *robust competitiveness*,<sup>1</sup> *sustainable entrepreneurship*,<sup>2</sup> and *democratic capitalism*,<sup>3</sup> central to its philosophy and objectives. More specifically, the aim of this series is to highlight emerging research and practice at the dynamic intersection of these fields, where individuals, organizations, industries, regions, and nations are harnessing creativity and invention to achieve and sustain growth.

Books that are part of the series explore the impact of innovation at the “macro” (economies, markets), “meso” (industries, firms), and “micro” levels (teams, individuals),

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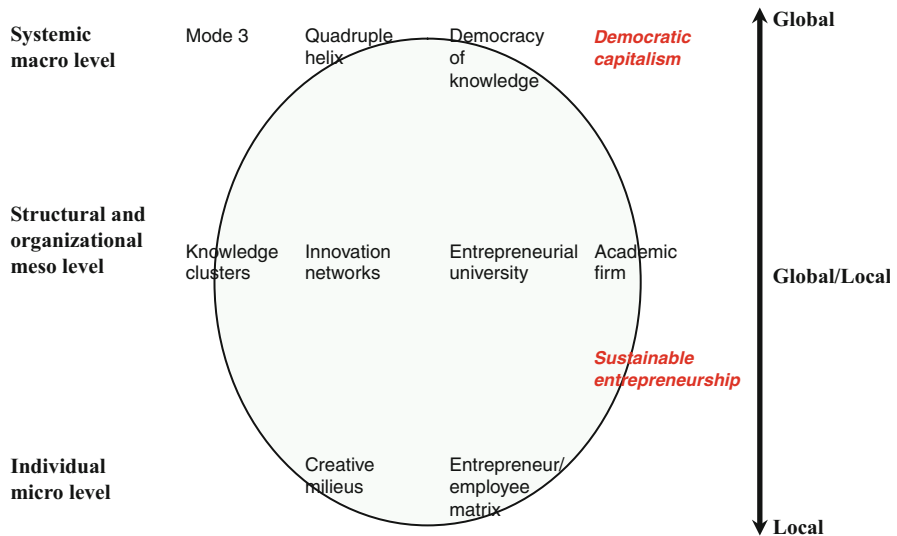
<sup>1</sup> We define *sustainable entrepreneurship* as the creation of viable, profitable, and scalable firms. Such firms engender the formation of self-replicating and mutually enhancing innovation networks and knowledge clusters (innovation ecosystems), leading toward robust competitiveness (E.G. Carayannis, *International Journal of Innovation and Regional Development* 1(3), 235–254, 2009).

<sup>2</sup> We understand *robust competitiveness* to be a state of economic being and becoming that avails systematic and defensible “unfair advantages” to the entities that are part of the economy. Such competitiveness is built on mutually complementary and reinforcing low-, medium-, and high-technology and public- and private-sector entities (government agencies, private firms, universities, and nongovernmental organizations) (E.G. Carayannis, *International Journal of Innovation and Regional Development* 1(3), 235–254, 2009).

<sup>3</sup> The concepts of *robust competitiveness* and *sustainable entrepreneurship* are pillars of a regime that we call “*democratic capitalism*” (as opposed to “popular or casino capitalism”), in which real opportunities for education and economic prosperity are available to all, especially—but not only—younger people. These are the direct derivatives of a collection of top-down policies as well as bottom-up initiatives (including strong research and development policies and funding, but going beyond these to include the development of innovation networks and knowledge clusters across regions and sectors) (E.G. Carayannis and A. Kaloudis, *Japan Economic Currents*, p. 6–10 January 2009).

drawing from such related disciplines as finance, organizational psychology, research and development, science policy, information systems, and strategy, with the underlying theme that for innovation to be useful it must involve the sharing and application of knowledge.

Some of the key anchoring concepts of the series are outlined in the figure below and the definitions that follow (all definitions are from E.G. Carayannis and D.F.J. Campbell, *International Journal of Technology Management*, 46, 3–4, 2009).



#### Conceptual profile of the series *Innovation, Technology, and Knowledge Management*

- The “Mode 3” Systems Approach for Knowledge Creation, Diffusion, and Use: “Mode 3” is a multilateral, multinodal, multimodal, and multilevel systems approach to the conceptualization, design, and management of real and virtual, “knowledge-stock” and “knowledge-flow,” modalities that catalyze, accelerate, and support the creation, diffusion, sharing, absorption, and use of cospecialized knowledge assets. “Mode 3” is based on a system-theoretic perspective of socio-economic, political, technological, and cultural trends and conditions that shape the coevolution of knowledge with the “knowledge-based and knowledge-driven, global/local economy and society.”
- Quadruple Helix: Quadruple helix, in this context, means to add to the triple helix of government, university, and industry a “fourth helix” that we identify as the “media-based and culture-based public.” This fourth helix associates with “media,” “creative industries,” “culture,” “values,” “life styles,” “art,” and perhaps also the notion of the “creative class.”

- **Innovation Networks:** Innovation networks are real and virtual infrastructures and infratechnologies that serve to nurture creativity, trigger invention, and catalyze innovation in a public and/or private domain context (for instance, government–university–industry public–private research and technology development cooperative partnerships).
- **Knowledge Clusters:** Knowledge clusters are agglomerations of cospecialized, mutually complementary, and reinforcing knowledge assets in the form of “knowledge stocks” and “knowledge flows” that exhibit self-organizing, learning-driven, dynamically adaptive competences and trends in the context of an open systems perspective.
- **Twenty-First Century Innovation Ecosystem:** A twenty-first century innovation ecosystem is a multilevel, multimodal, multinodal, and multiagent system of systems. The constituent systems consist of innovation metanetworks (networks of innovation networks and knowledge clusters) and knowledge metaclusters (clusters of innovation networks and knowledge clusters) as building blocks and organized in a self-referential or chaotic fractal knowledge and innovation architecture<sup>4</sup>, which in turn constitute agglomerations of human, social, intellectual, and financial capital stocks and flows as well as cultural and technological artifacts and modalities, continually coevolving, cospecializing, and cooperating. These innovation networks and knowledge clusters also form, reform, and dissolve within diverse institutional, political, technological, and socioeconomic domains, including government, university, industry, and nongovernmental organizations and involving information and communication technologies, biotechnologies, advanced materials, nanotechnologies, and next-generation energy technologies.

*To whom is this book series directed?* The book series addresses a diversity of audiences in different settings:

1. *Academic communities.* Academic communities worldwide represent a core group of readers. This follows from the theoretical/conceptual interest of the book series to influence academic discourses in the fields of knowledge, also carried by the claim of a certain saturation of academia with the current concepts and the postulate of a window of opportunity for new or at least additional concepts. Thus, it represents a key challenge for the series to exercise a certain impact on discourses in academia. In principle, all academic communities that are interested in knowledge (knowledge and innovation) could be tackled by the book series. The interdisciplinary (transdisciplinary) nature of the book series underscores that the scope of the book series is not limited a priori to a specific basket of disciplines. From a radical viewpoint, one could create the hypothesis that there is no discipline where knowledge is of no importance.
2. *Decision makers—private/academic entrepreneurs and public (governmental, subgovernmental) actors.* Two different groups of decision makers are being addressed simultaneously: (1) private entrepreneurs (firms, commercial firms,

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<sup>4</sup>E.G. Carayannis, *Strategic Management of Technological Learning*, CRC Press, 2000.



academic firms) and academic entrepreneurs (universities), interested in optimizing knowledge management and in developing heterogeneously composed knowledge-based research networks; and (2) public (governmental, subgovernmental) actors that are interested in optimizing and further developing their policies and policy strategies that target knowledge and innovation. One purpose of public *knowledge and innovation policy* is to enhance the performance and competitiveness of advanced economies.

3. *Decision makers in general.* Decision makers are systematically being supplied with crucial information, for how to optimize knowledge-referring and knowledge-enhancing decision-making. The nature of this “crucial information” is conceptual as well as empirical (case-study-based). Empirical information highlights practical examples and points toward practical solutions (perhaps remedies), conceptual information offers the advantage of further-driving and further-carrying tools of understanding. Different groups of addressed decision makers could be decision makers in private firms and multinational corporations, responsible for the knowledge portfolio of companies; knowledge and knowledge management consultants; globalization experts, focusing on the internationalization of research and development, science and technology, and innovation; experts in university/business research networks; and political scientists, economists, and business professionals.
4. *Interested global readership.* Finally, the Springer book series addresses a whole global readership, composed of members who are generally interested in knowledge and innovation. The global readership could partially coincide with the communities as described above (“academic communities,” “decision makers”), but could also refer to other constituencies and groups.

Elias G. Carayannis  
Series Editor

# Foreword

Sustainability means different things to different people. I do not care about the definition of sustainability, but I care about the future generations of this planet and how they can lead better lives. This care of mine, reflected throughout Japan, is inherited from our ancestors, who worked hard and hoped to make a better world. Their wishes still run in our bodies and minds, as well as our society and environments. Sustainability is built into our genes, and we will deliver this to our descendants.

As a part of my work, I am engaged in several activities at the National Institute of Science and Technology Policy in Japan. The Institute develops forecasts in science and technology and studies various topics that impact our society and life, including regional and global innovation systems, private and public intellectual communities, and educational systems for current and future generations. This task necessarily involves engagement with a wide variety of people from different backgrounds and spheres, each with their own understanding and needs on often complex subjects.

This complex collaboration is true also in my other work, which has crossed multiple institutional spheres. I have worked at private companies, both domestically and globally—such as Toshiba, IBM, and SCSK Corporation (formerly CSK)—for research and business. My time is also devoted to educational tasks at different academic institutions where I teach a wide range of subjects from information systems management to design thinking for innovation and sustainability.

This is why I am encouraged to see this volume, *Sustaining Innovation: Collaboration Models for a Complex World*, which offers a practical set of real-world examples, visions, and research insights for today’s policymakers, as well as business leaders and academics.

Sustainability requires change. From a Japanese perspective, I have seen my nation overcome and enjoy many changes to its industrial base, economy, and demographics to become one of the most innovative countries of the last 50 years. Yet we face again new and complex challenges, such as the recent earthquake and tsunami. The Japanese islands, standing at the edge of the Eurasian continent facing the Pacific Ocean and the Americas beyond, have brought varying degrees of change; people, things, and ideas come from both sides of the world, east and west. And now, ever-advancing technology accelerates that change to drive innovation.

So, for those of you engaged in the pursuit of sustaining innovation and building a better future for society, no matter if you approach the opportunity from a policy, academic, or industry domain, I commend this volume, edited by Steven MacGregor and Tamara Carleton, as a means of helping you design and deliver that future. It will certainly be one of the resources I keep on my bookshelf.

Tokyo, Japan

Toshiaki Kurokawa

# Introduction

Evolutionary scientist Charles Darwin once noted, “In the long history of humankind (and animal kind, too) those who learned to collaborate and improvise most effectively have prevailed.” In many ways, the process of innovation is a constant social dance, where the best dancers thrive by adapting new steps with multiple partners. The systematic and continuous generation of value in any innovation system relies on collaboration between different groups, who must overcome multiple, often competing, agendas and needs to work together fruitfully over the long term. In this collection of essays and viewpoints, we investigate different combinations of collaborative relationships between innovation actors, many of which are changing conventional expectations of institutional relationships.

In short, no particular combination has emerged as the most dominant, or even resilient, model of innovation. Several of the authors in this volume expand on our understanding of the triple helix model, with both academics and practitioners looking to the quadruple helix as the new standard. Other authors address aspects of open innovation, co-creation, user-centered design, and mass customization—all testaments to the rapidly shifting landscape. At the same time, many businesses, academics, and governments, not to mention nonprofit organizations, foundations, and society at large, are active in conversations about how to pursue a more sustainable model of innovation. The pursuit of this holy grail of innovation is both facilitated and complicated by an ever-accelerating technological landscape in which social networking and mobile tools are emerging as new dance arenas.

## On Sustainability

First, a disclaimer about the book’s central theme: we know that the word sustainability is quickly following that of innovation into buzz-word hell that makes it almost meaningless in certain situations, or at least invisible due to its omnipresence. Yet sustainability is wholly appropriate for our context for two main reasons. First, the economic crisis of recent years makes us reflect on the durability of any

success we may enjoy, and second, we investigate the role of society in collaboration for that durability. We therefore consider sustainability from the *value* perspective—the enduring competitive position of an organization and its ability to innovate on a continual basis as shown by its market results—as well as the *values* perspective in which the society-wide context of sustainable development is complemented by the role of business within society through corporate social responsibility (CSR). The gerund of sustainability (in other words, the “-ing”) is also used on purpose, since the word emphasizes the work in progress of continuous innovation, as well as the action, dynamism, and scale of the challenge.

Value and values have rarely been comfortable bedfellows, at times due to problems regarding the nuances of language and resulting misconceptions, yet there is much common ground to be exploited in this increasingly collaborative era. Both value and values, as we describe them here, necessarily take note of a broad church of stakeholders, be they end users, suppliers, employees, or other actors in an innovation ecosystem.

A growing number of scholars and practitioners have addressed the links between the two concepts. Michael Porter’s thesis on shared value (Porter and Kramer 2011) attempts to move notions of responsibility and fairness closer to the economic mainstream by linking values with value, and, in spite of some criticism, is a positive contribution to the field of economic management. Porter advises on dropping the CSR term, partly given the US-centric view that CSR is closely associated to philanthropy, yet Europe has traditionally taken a broader view on the term with, for example, previous work on Corporate Social *Opportunity* (Grayson and Hodges 2004) helping to influence Porter’s current thesis.

In our view, CSR, by whatever name, is important to an understanding of sustainability because it provides a set of guidelines and mission-driven ethos that there ought to be a better way of doing things that is in the best interests of all in the long term. Innovators, including William McDonough with the Cradle-to-Cradle concept, show a possible future vision that brings together elements of both value and values. In other words, what an organization believes (values) can powerfully influence what is produced (value). What is this smarter way of working called? We challenged our authors to consider their own definitions and terminology.

Ultimately, we believe that the systematic, continuous generation of value can only be achieved when all stakeholders are considered and share in that value or, at the very least, are not victims of others’ value gain. As an example, consider the rapid growth of Silicon Valley, which continues to dominate innovation rankings. The region exemplifies broad-based employee ownership, in which nonexecutive employees and line workers have the opportunity to own company shares and stock options in their own companies, allowing them to benefit from their knowledge and labor alongside management and investors. Practices in good corporate citizenship and user-driven innovation have similar visions of broad stakeholder involvement at their core, engaging extensive communities of users in the process of value creation. These examples and more confirm to us that a multilayered consideration of sustainability, in which responsibility, inclusiveness, and competitiveness are intertwined, is both necessary and meaningful to our investigation of complex collaboration models.

## **On Global Networks**

Global interactions add another dimension to the complexity. Collaboration with a spectrum of external partners—including foreign competition, international alliances and consortia, and technical communities—has growing increasingly commonplace in the last few decades. Innovation network experts Walter Powell and Stine Grodal (2005) find that, “Complex networks of firms, universities, and government labs are critical features of many industries, especially so in fields with rapid technological progress, such as computers, semiconductors, pharmaceuticals, and biotechnology” (pg. 58). Social media and other online tools have accelerated the uptake of distributed networks of practice, whose users are often spread over location and international research and development (R&D) sites.

However, it is easy to get carried away with the recent explosion in social media, and many have subscribed to the fact of a completely flat world (Friedman 2005). Yet the data shows that, far from being completely global, local differences do still matter (Ghemawat 2011). Only 2% of students are at universities outside their home countries, and only 3% of people live outside their country of birth. In addition, less than 1% of all American companies have any foreign operations, while Foreign Direct Investment (FDI) accounts for only 9% of all fixed investment. These numbers help us to reset our assumptions about technology’s actual impact on global collaboration.

We consider, therefore, that the difficulty in sustaining innovation could be due to a lack of understanding of local differences and specific needs of regional stakeholders. Our aim is to uncover enduring models of smarter work by learning how different regions have redefined and adapted practices of collaboration in a globally networked world. We deliberately asked the authors to take a global multistakeholder perspective, and through their stories, they describe and analyze established innovation hotspots in the USA and Europe, as well as emerging and rapidly growing economies, including India and Africa. By finding new examples from around the world, we hope to expand on the usual discussions of collaboration and add different voices to the overall dialogue.

## **Models of Complex Collaboration**

The state of knowledge about innovation collaboration continues to grow. The classic model is the triple helix, which refers to the innovation triad of business, academia, and government. Introduced by European professor Henry Etzkowitz (1996) some 15 years ago, this simple model helps explain the dynamic interplay occurring between these three institutional spheres. In their classic roles, government authorities provide the social mission, regulation requirements, and funding; academic groups lead in research and discovery efforts; and businesses find new market opportunities that put the resulting innovation into the hands of users. Etzkowitz posited that these roles were becoming increasingly shared and interdependent.

Businesses, universities, and governments—previously relatively separate and distinct institutions—were now assuming tasks in the development of new technologies that were once the province of the other.

During the late 1990s and 2000s, the mainstream adoption of the Internet influenced practices of distributed working and applications of social computing. The individual became involved in broad-scale innovation in more ways, and power dynamics shifted slightly in the original model of the triple helix. Collaboration became more fluid within and between the different institutional spheres, and the notion of a quadruple helix emerged that blended in the perspective of a media-based and culture-based public (Carayannis and Campbell 2009). The new fourth axis encompasses civil society in terms of consumers, nongovernmental organizations, and citizens—many of whom are active in designing their own services, providing input at key points in the innovation process, and determining the final value of innovation output. A more recent notion is the quintuple helix, which frames knowledge and innovation in the context of the natural environment with an overarching goal of sustainable development (Carayannis and Campbell 2010).

Other models have gained traction in innovation circles, particularly with corporate management. The philosophy of user-centered design through books such as *The Design of Everyday Things* (Norman 1986) puts the needs of users at the center of the standard product design and development process. Many see consumer electronics manufacturer Apple at the forefront of this movement. Another model of open innovation, first described by Henry Chesbrough (2003), addresses collaboration in terms of outsourcing partners, challenging notions of inventing from within an organization. In this spirit, consumer products company Procter & Gamble transformed their R&D process several years ago, requiring internal product teams to source at least 50% of their ideas for new or refined products from outside the company (Huston and Sakkab 2006).

Governments have also experimented with different models of collaboration. The early 1990s saw a rise in the concept of National Innovation Systems, described by the OECD (1997) as “the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify, and diffuse new technologies.” OECD observed that previous analysis focused primarily on innovation inputs (such as research expenditures) and outputs (such as patents). In knowledge-based economies, the interactions between actors involved in technology development are equally as important as investments in R&D because the actors are key to translating the inputs into outputs. An active flow of knowledge, such as the movement of personnel or joint industry research, ensures the smooth operation of national innovation systems.

Many more flavors of collaboration abound. The truth is, the dialogue is still emerging, and as the world evolves, more groups will continue working together in new and different ways. Through the collected stories in this volume, we aim to take another step forward in understanding and defining what complex collaboration is about in the pursuit of innovation.

## Multiple Viewpoints on Sustaining Innovation

Toward that end, we invited a range of authors from different regions, industries, and professions to describe their work firsthand with complex collaboration. We asked them: What new models have they been building and experiencing? What lessons could they share with others interested in sustainable innovation? How did they engage different groups and ensure both value- and values-driven interaction within and across their innovation networks and communities?

As we heard from our colleagues around the world, we encountered an unexpected challenge in organizing their stories. Our first impulse was to organize stories by the lead actor, the institutional sphere responsible most for driving change. Many of the examples involve the consumer or civil society in some fashion; all the stories cross the three institutional spheres of influence of the triple helix. However, we felt that this approach perpetuated institutional silos, and many of the authors described activities beyond a group's usual role.

Then we considered presenting the stories in terms of theory and practice. We found many of the professors studied and even intervened in their industry cases, and our contributing practitioners reflected deeply on the abstract principles underlying action. Next, we debated presenting the stories in terms of their regional context. Then again, we found many examples crossed geographic borders.

Finally, we identified a more provocative and meaningful structure that revealed the state of development in each author's collaboration model: Visions, Research, and Experiences. Some models are in the formative stage of inspiration (Visions), others are under analysis and critical interpretation (Research), and a third set are in deep experimentation and implementation mode (Experiences). These three sections of Visions, Research, and Experiences are each comprised of several chapters, all of which are described and connected below.

### *Section I: Visions*

In the first section, the authors present their visions of collaboration. They imagine future possibilities that are realistic, credible, and attractive to all the organizations involved. While some pieces exist today, the bulk of effort, alignment, and integration must happen over time. These visions orient everyone to future possibility and provide positive direction or even a call to arms for a new model of collaboration.

In Chap. 1, Nam Mokwunye, a visiting scholar at Stanford University in the USA, offers a broad and ambitious vision on sustaining innovation in the African continent. He focuses on the telecommunication sector, which is heavily regulated, fragmented, and disorganized with inadequate infrastructure in multiple African economies. Clarifying the quadruple helix model, Mokwunye distinguishes between nongovernment groups in civil society and end users in their influence on practices of local technology transfer. With a different twist on innovation networks, his vision unifies physical, social, and virtual networks in the pursuit of scalable and sustainable innovation in African telecom.



Laura Ahonen and Tuija Hämäläinen from the City of Jyväskylä in Finland report on the groundbreaking CLIQ project in Chap. 2. CLIQ attempted to gain a practical, policy-based view on the quadruple helix model and was conducted by public administrations in small- and medium-sized European cities. The authors report on the resultant visions for the practical implementation of multihelix collaboration, including a benchmarking methodology, blueprint, and toolkit for innovation. They present their learning journey in discovering the notion of the quadruple helix and how it can be supported.

In Chap. 3, Josep Lluís de la Rosa and Andrea Bikfalvi of the University of Girona in Spain describe their vision for reinventing the practice of carpooling for the digital age, with a spin-off company currently putting their vision into action. Through the creation of the First Bank of Cents, they show how social currencies, web 2.0, and GPS technology can influence good citizen behavior and corporate responsibility around a common cause. Their bold idea has precedence, building on other forms of social commuting—such as the successful American practice of casual carpooling, known as “slugging” in the Washington, DC area, that has been underway since 1975.

## ***Section II: Research***

The second section presents a set of research projects with the authors taking a critical view of the causes and developments in a particular context, including the Swedish healthcare system, the Indian design industry, and European textiles. The first two chapters focus on actor collaboration in the triple helix while a case study approach is taken in the final two chapters.

In Chap. 4, Andreas Larsson, Susanna Bill, Jenny Ingridsson, and Annika Olsson address the changes underfoot in the Swedish healthcare system, particularly related to the design and procurement of new Swedish healthcare devices. Drawing from their experiences as Swedish research scholars over a 3-year project, the authors describe some of the lessons and challenges that the different project groups encountered during their regular learning sessions.

From the Ideas Lab at the Indian Institute of Science in India, Chap. 5 shows Gokula Vijaykumar A.V. and Amaresh Chakrabarti’s report on the findings of two Indian companies in the engineering design industry. They focus on the critical role of knowledge processes in industrial design collaboration. Finding current knowledge process models to be inadequate to support design collaboration, they propose the KRIT model and a related Influence model, which show how the elements of Knowledge, Requirements, Interactions, and Tasks may better support design work.

Alexandra Simon and Pilar Marquès, also from the University of Girona in Spain, investigate how fourth-pillar organizations can genuinely support triple helix collaboration in Chap. 6. Through four case studies in three European countries, they develop the concept of these hybrid organizations and how their use in Europe differs from that in the USA and Canada, offering in the process an alternative European model to complement previously published work on the subject.

In Chap. 7, Nigel Roome and Céline Louche from Vlerick Business School in Belgium take a deeper look at Rohner Textil AG, a Swiss textile company that, in

collaboration with William McDonough, was one of the first ever companies to apply the Cradle-to-Cradle concept on a business level. They describe how Rohner updated its corporate vision in partnership with DesignTex, an American fabric design company. Rohner then engaged other groups in its production network—including wool farmers, chemical dye suppliers, loom equipment providers, and government regulators—to realize an ambitious vision of quality compostable products and process management. By studying Rohner, the authors demonstrate that genuine sustainable development requires shared leadership and active alignment of multiple stakeholders. They also show that learning at one company can influence practices and applications in other networks globally.

### ***Section III: Experiences***

The final section of Experiences emphasizes networks of complex collaboration in action. Three of the chapters reflect on corporate-driven networks that have brought a diverse mix of innovation partners and stakeholders together to find new market opportunities and enhance the user experience. The other chapter describes a recent government-led effort that has redefined regional industry relationships and added a layer of virtual interactions to the physical networking. All authors pursued an interest in long-term value and network sustainability.

Álvaro Morón Alonso, innovation manager at the Spanish bank BBVA, together with Capgemini consultant Javier Sebastián Cermeño detail the innovation network that BBVA has constructed to support their innovation endeavors in Chap. 8. They illustrate a fascinating case of how a financial services firm can have a broad interest in innovation outside of their core business, sharing insider details about the current global configuration of the network and IDEO's role in the design of a new generation of cash machines.

Chap. 9 presents the experiences of innovation expert David Coates, who has served an influential role in building and enhancing the knowledge networks served by the Technology Strategy Board, the national innovation agency of the UK. The agency's goal is to accelerate economic growth by stimulating and supporting business-led innovation, partly by bringing different organizations together in a complex web of business, academic, and government communities. Coates describes a new online platform that facilitates knowledge sharing for the country's broad network of small businesses, and he explains the unique role a community manager must serve to ensure a vibrant and self-sustaining exchange within the network.

In Chap. 10, Dagmar Chlosta explains how she introduced the use of virtual samples in the product development and production process at a global sporting goods company. Adopting techniques from 3D visualization, Chlosta led a transformation process similar to how Boeing designed its 777 aircraft entirely by computer during the early 1990s. The process at the sporting goods company required changing the mind-set of all the groups involved, and Chlosta encouraged a shift in values through multiple tactics, including training partners and engaging customers at key points.

Bringing the Experiences section and the book to a close in Chap. 11, New Zealander futurist Roger Dennis, British strategist Tim Jones, and British executive Leo Roodhart look to the future. Opening with the influential case of Shell's

GameChanger initiative of the early 2000s, they recount the development of foresight science, focusing on Vodafone's Future Agenda program as an example of an open source network. Recognizing the importance of a global outlook balanced by local differences, the Future Agenda team held 50 workshops in 25 locations around the world, gathering insights from over 2,000 people.

In sum, we have attempted to encourage, guide, and ultimately represent a global conversation in a way that makes you, as the reader, feel compelled to join. This conversation is made up of 22 authors from Belgium, Finland, Germany, India, New Zealand, Nigeria, Spain, Sweden, UK, and the US, representing the full scope of the triple helix and beyond. We have attempted to balance business cases (Chaps. 7 and 10) with bold visions (Chap. 1), insightful research that focuses on key units of analyses such as collaboration (Chaps. 4 and 5) with practical-based research based on key projects (Chaps. 2 and 6), as well as entrepreneurial endeavors that such projects aim to support (Chap. 3). Finally, we have shown large-scale networks in action (Chaps. 8, 9, and 11) that we see becoming an ever more common and necessary element of our increasingly complex world, one in which sustaining innovation will remain a constant challenge.

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## References

- Carayannis E G, Campbell D F J (2009) "Mode 3" and "quadruple helix": Toward a 21st century fractal innovation ecosystem. *Int J of Technol Manage*, 46(3/4):201–234.
- Carayannis E G, Campbell D F J (2010) Triple helix, quadruple helix and quintuple helix and how do knowledge, innovation and the environment relate to each other? A proposed framework for a trans-disciplinary analysis of sustainable development and social ecology. *Int J of Soc Ecol Sust Dev*, 1(1): 41–69.
- Chesbrough H (2003) *Open innovation: The new imperative for creating and profiting from technology*. Harvard Business School, Cambridge, US.
- Etzkowitz, H. (1996) The triple helix: Academic-industry-government relations in New York. In Raymond, S U (Ed.), *The technology link to economic development: Past lessons and future imperatives*. Academy of Sciences, New York.
- Friedman T L (2005) *The world is flat: A brief history of the twenty-first century*. Farrar, Straus & Giroux, New York.
- Ghemawat P (2011) *World 3.0: Global prosperity and how to achieve it*. Harvard Business Press, Cambridge.
- Grayson D, Hodges A (2004) *Corporate social opportunity! Seven steps to make corporate social opportunity work for your business*. Greenleaf Publishing, Sheffield, UK.
- Huston L, Sakkab N (2006) Connect and develop: Inside Procter & Gamble's new model for innovation. *Harvard Bus Rev*, March:58–66.
- Norman D (1986) *The design of everyday things*. MIT Press, Cambridge, US.
- Organisation for Economic Co-operation and Development (OECD) (1997) *National Innovation Systems*. OECD Publications, Paris.
- Porter M E and Kramer M (2011) Creating Shared Value'. *Harvard Bus Rev*, January/February: 62–77.
- Powell W W, Grodal S (2005) Networks of innovators. In Fagerberg J, Mowery D C, Nelson R R (Eds.), *The Oxford handbook of innovation*. Oxford University, New York.

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